

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Principal Facts for Gravity Stations in Part of the Wallace 1° x 2°

Quadrangle, Idaho and Montana

by

Michael R. Brickey, Viki Bankey, and M. Dean Kleinkopf

Open-File Report No. 81-178

1980

This report is preliminary and has not been edited or reviewed for conformity with the U.S. Geological Survey standards. Use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

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Principal facts for gravity stations in part of the Wallace $1^{\circ} \times 2^{\circ}$
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Introduction

During the summers of 1976-79, gravity data were collected in the Wallace $1^{\circ} \times 2^{\circ}$ quadrangle in Idaho and Montana (fig. 1). The work was done in support of CUSMAP (Conterminous United States Mineral Appraisal Program). The data complement gravity surveys done previously by Wilson (1979).

Data collection

Gravity observations were made at more than 600 locations using LaCoste-Romberg and Worden gravity meters. The observations were referenced to the DOD (Department of Defense) bases at Missoula, Mont., Polson, Mont., and Wallace, Idaho, which are on the datum of the International Gravity Standardization Net, IGSN-71 (Defense Mapping Agency Aerospace Center, 1974).

Secondary base stations were established at the following locations: Hot Springs, Lakeside, Little North Fork, Plains, and Thompson Falls, Mont. Base descriptions are included in Appendix A.

Elevation Control

Station elevations were obtained from surveyed bench marks, spot elevations, and contour interpolations on U.S. Geological Survey topographic maps at scales of 1:24,000 and 1:62,500. Elevation accuracy is estimated to vary from 0.2 m for bench marks to 6.1 m for contour interpolations. The maximum resultant error of the Bouguer anomaly is estimated to be less than 2 mgal (milligals).

Data reduction

Computer programs on the U.S. Geological Survey Honeywell Multics computer system were used to obtain principal facts and terrain corrected gravity values. An unpublished program by D. A. Dansereau and R. R. Wahl was used to calculate corrections for earth tides and linear meter-drift in order to obtain the observed gravity values. The theoretical gravity value was calculated using the 1967 formula of the Geodetic Reference System (International Association of Geodesy, 1967).

Terrain corrections were computed, using a program by R. H. Godson (U. S. Geological Survey, unpublished data), from each station out to 166.7 km using the method of Plouff (1977). The program uses mean elevation data on a 15-second grid for corrections from 0 to 5 km; 1-minute terrain data for corrections from 5 to 21 km, and 3-minute terrain data for corrections from 21 to 166.7 km. An assumed density of 2.67 g/cm^3 (grams per cubic centimeter) was used for terrain corrections. This program also calculates earth curvature corrections and complete (terrain corrected) Bouguer anomaly values. Corrections for terrain ranged from 0.25 mgal to 29.20 mgal. Two complete Bouguer anomaly values per station were obtained, assuming average rock densities of 2.67 g/cm^3 and 2.45 g/cm^3 . The principal facts for these data are listed in Appendix B.

References

- Defense Mapping Agency Aerospace Center, 1974, World Relative Gravity Reference Network, North America. Part 2. Defense Mapping Agency Aerospace Center Reference Publication 25, with supplement updating gravity values to the International Gravity Standardization Net 1971, 1635 p.
- International Association of Geodesy, 1967, Geodetic Reference System, 1967, International Association of Geodesy Special Publication 3, 74 p.
- Plouff, D., 1977, Preliminary documentation for a FORTRAN program to compute gravity terrain corrections based on topography digitized on a geographic grid: U.S. Geological Survey Open-File Report 77-535.
- Wilson, D. M., 1979, Principal facts for gravity stations in the Wallace 2° Quadrangle, Montana and Idaho: U.S. Geological Survey Open-File Report 79-1309.

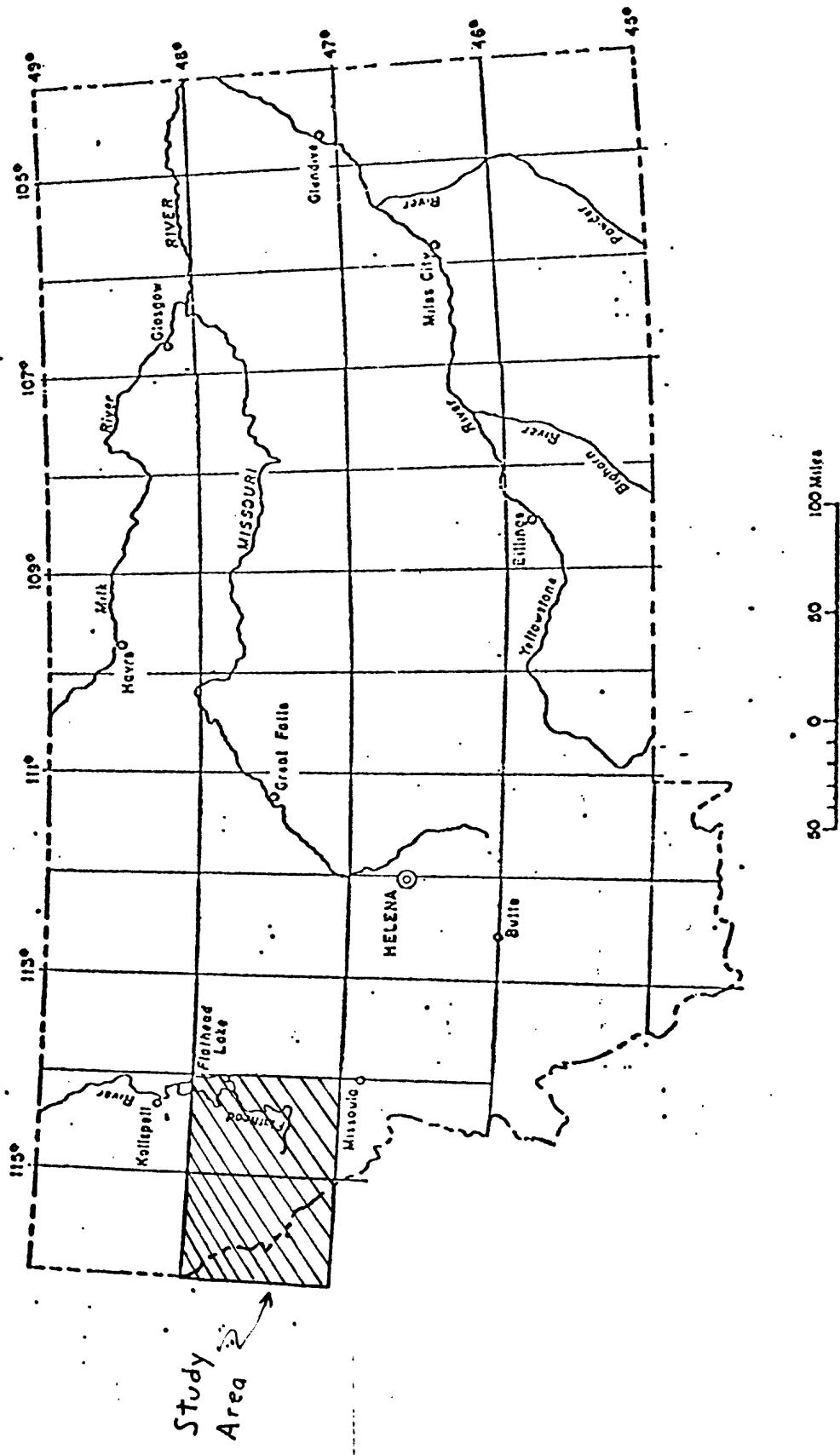


Fig. 1

Appendix A

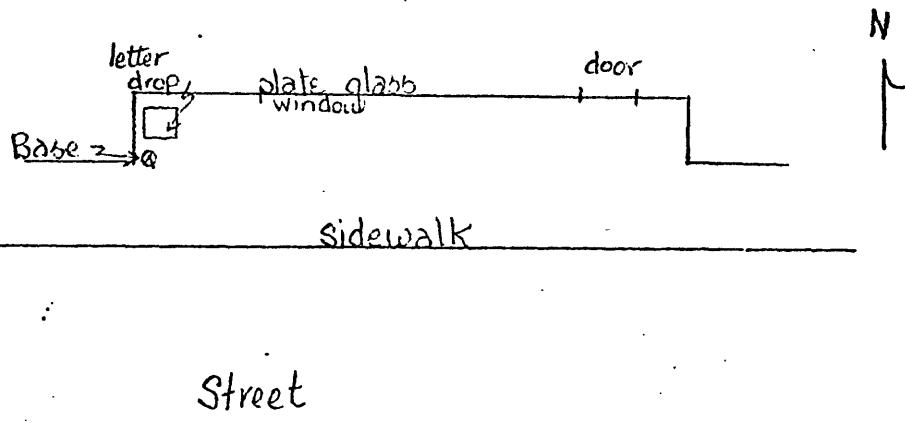
Description of gravity base stations

**U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION**

STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY		
Montana	Hot Springs	980558.33		
NEAREST TOWN	LONGITUDE	LATITUDE		
Hot Springs	114° 40.20'	47° 36.52'		
ELEVATION	TOPOGRAPHIC MAP(S)			
867.3 m (2845')	Hot Springs 1/24,000			
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
7/11/78	Brickey/Kleinkopf	G-235	Kalispell Airport(DOD)	980567.39 mgals

DESCRIPTION/SKETCH

Base read in front of U.S. Post Office, Hot Springs, at west end, in front along sidewalk and next to the letter drop.

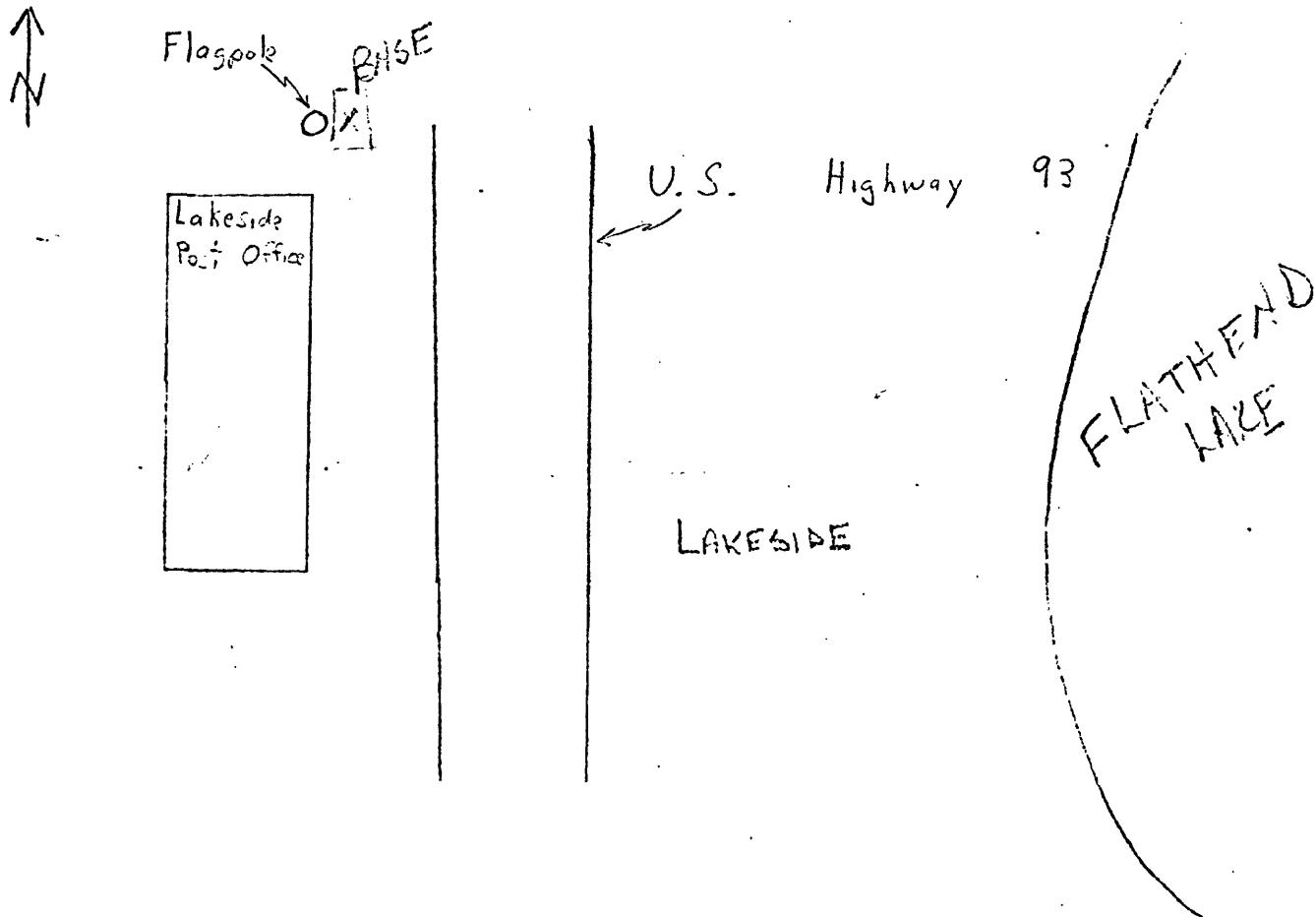


U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION

STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY		
Montana	Lakeside Post Office	980572.93		
NEAREST TOWN	LONGITUDE	LATITUDE		
Lakeside	114° 13.42'	48° 01.18'		
ELEVATION	TOPOGRAPHIC MAP(S)			
887.1 m (2910')	Kalispell 1/250,000			
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
7/17/78	Brickey/Kleinkopf	G-235	Kalispell Airport(DOD)	980567.39 mgals

DESCRIPTION/SKETCH

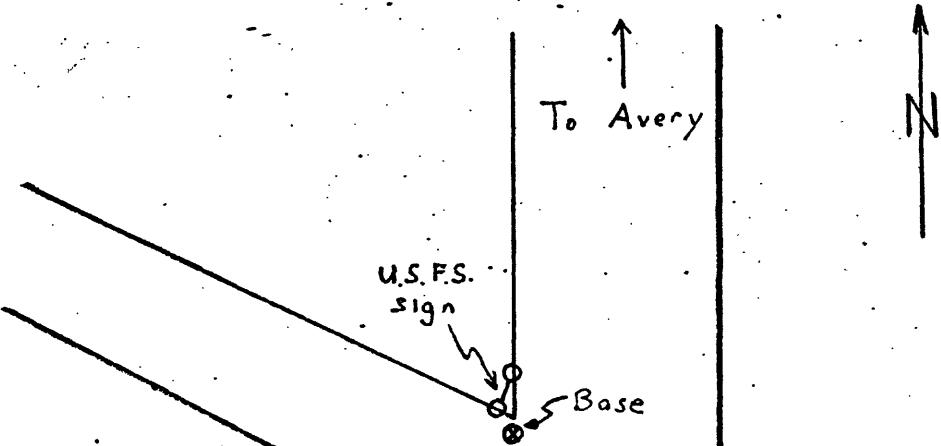
Read at base of flag pole, highway side, or cement slab about 3 meters north of main entrance.



U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION

STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY		
Idaho	Little North Fork Campground (SU595)	980422.25 mgals		
NEAREST TOWN	LONGITUDE	LATITUDE		
Avery	115° 51.24'	47° 03.97'		
ELEVATION	TOPOGRAPHIC MAP(S)			
1235 m (4052')	Wallace 1/250,000			
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
8/26/76	Kleinkopf	Worden E-134	Avery Railroad Yard	980525.51 mgals

DESCRIPTION/SKETCH



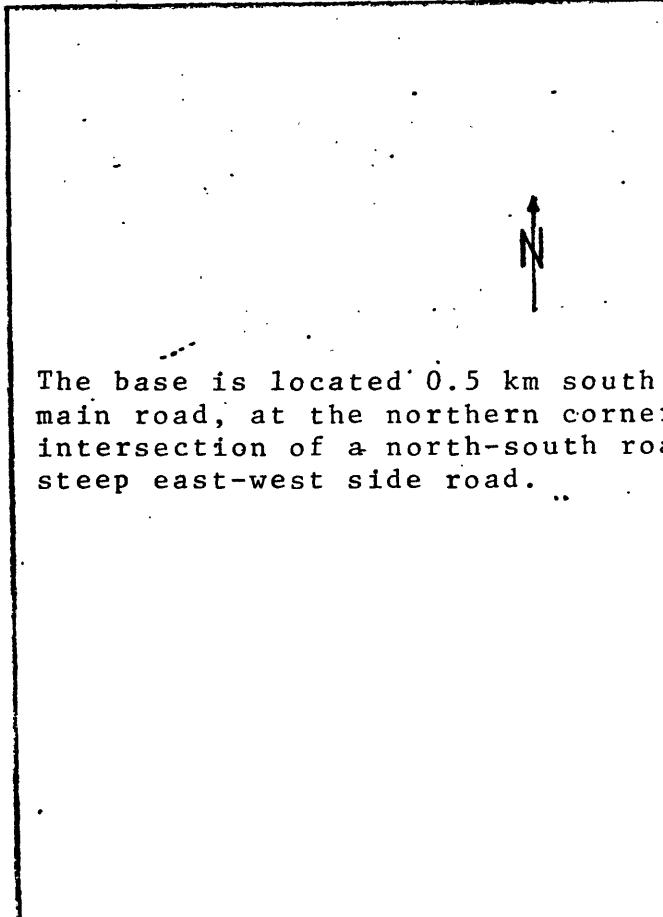
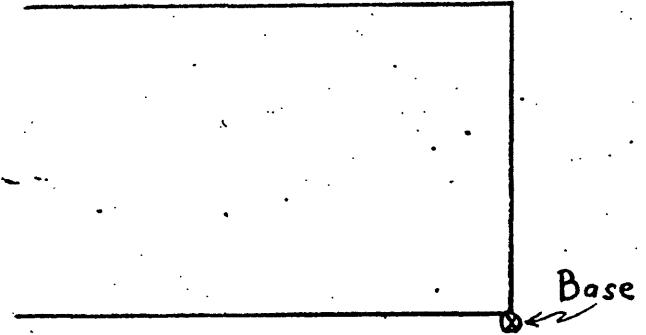
The base is located at the northern corner of the intersection of the north-south road to Avery and a diagonal side road, near a U.S. Forest Service sign.

U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION

STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY		
Idaho	Marble Creek (SU 739)	980544.75		
NEAREST TOWN	LONGITUDE	LATITUDE		
Avery	116° 01.22'	47° 14.73'		
ELEVATION	TOPOGRAPHIC MAP(S)			
713 m 2339'	Marble Mtn. 7 1/2'			
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
8/27/76	Kleinkopf	Worden E-134	Avery Bridge	980523.60

DESCRIPTION/SKETCH

Avery →
15 Km



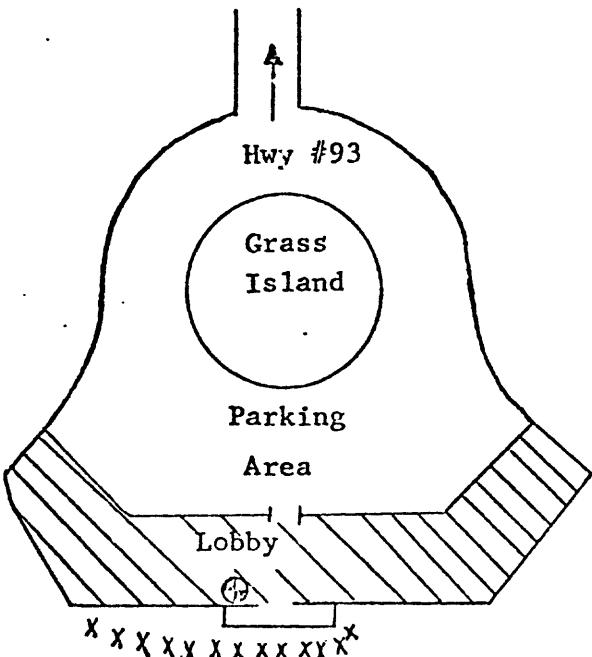
The base is located 0.5 km south of the main road, at the northern corner of the intersection of a north-south road and steep east-west side road.

GRAVITY BASE STATION

LATITUDE 46° 55.00' N	(1)	STATION DESIGNATION MISSOULA	
LONGITUDE 114° 06.50' W	(1)	COUNTRY/STATE USA/Montana	
ELEVATION 976.3 METERS (1)		ADOPTED GRAVITY VALUE $g = 980.443.15$ mgals	
REFERENCE CODE NUMBERS ACIC 0442-0 IGC 1566IJ WA 127		ESTIMATED ACCURACY ± 0.1 mgals	DATE MONTH/YEAR Aug/1968

DESCRIPTION AND/OR SKETCH

Station is located at the Missoula Airport, inside the lobby, on the tile floor, one foot west of the exit to the apron and aircraft. (1)



(2)

REFERENCE SOURCE

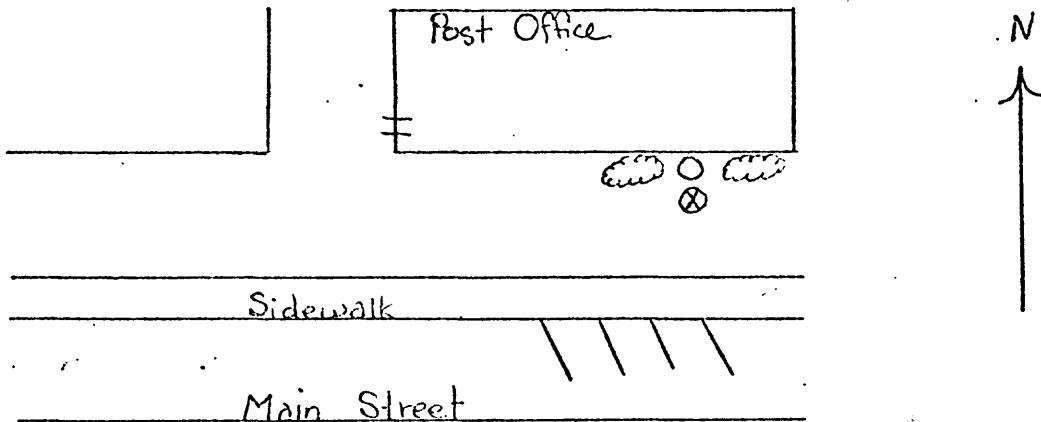
(1) 01355 (2) 05100

U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION

STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY
Montana	Plains Post Office	980554.98 mgals
NEAREST TOWN	LONGITUDE	LATITUDE
Plains	114° 52.95'	47° 26.34'
ELEVATION	TOPOGRAPHIC MAP(S)	
	Plains 1/62,000	
DATE	OBSERVER	METER
6/30/75	Kleinkopf/Wilson	G-159
		Cabinet Ranger Station
		mgals

DESCRIPTION/SKETCH

Base is at Post Office located on north side of Main Street and at base of flagpole.

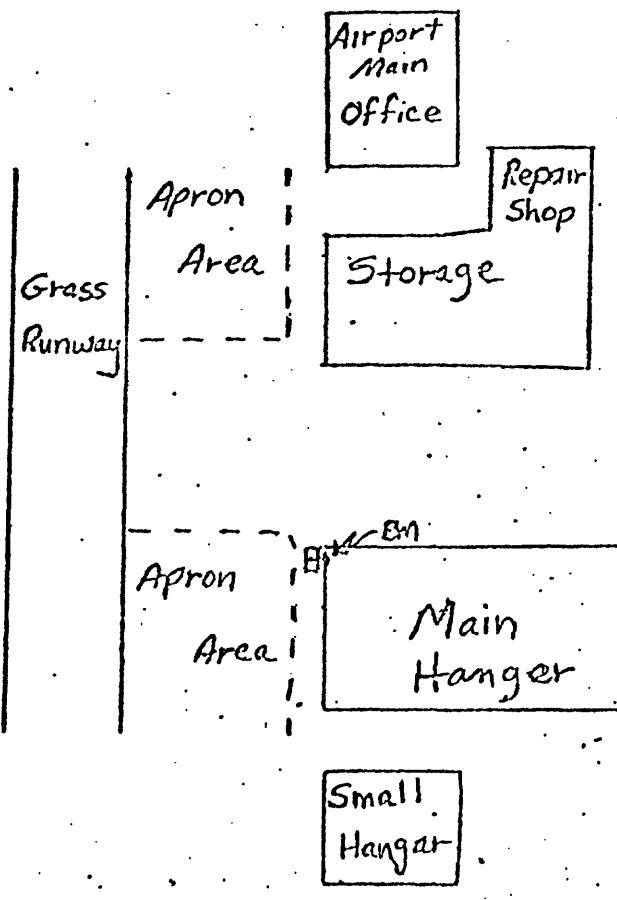


GRAVITY BASE STATION

LATITUDE	47° 41.00'N	(1)	STATION DESIGNATION	POLSON
LONGITUDE	114° 09.75'W	(1)	COUNTRY/STATE	USA/Montana
ELEVATION	893.93 METERS	(1)	ADOPTED GRAVITY VALUE	
REFERENCE CODE NUMBERS			$\bar{g} =$	980 564.25 mgals
ACIC 1223-0			ESTIMATED ACCURACY	DATE
IGB 15674J	-		+ 0.1 mgals	MONTH/YEAR 12/71

DESCRIPTION AND/OR SKETCH

Station is located at the Polson Airport, main hangar, one foot west of the foundation wall nearest the south apron area, on the ground outside the foundation wall containing a USC & GS BM stamped "B 376 1950". The BM is inside the hangar, one foot south of the hangar door and not visible from the station. (1)



(1)

REFERENCE SOURCE

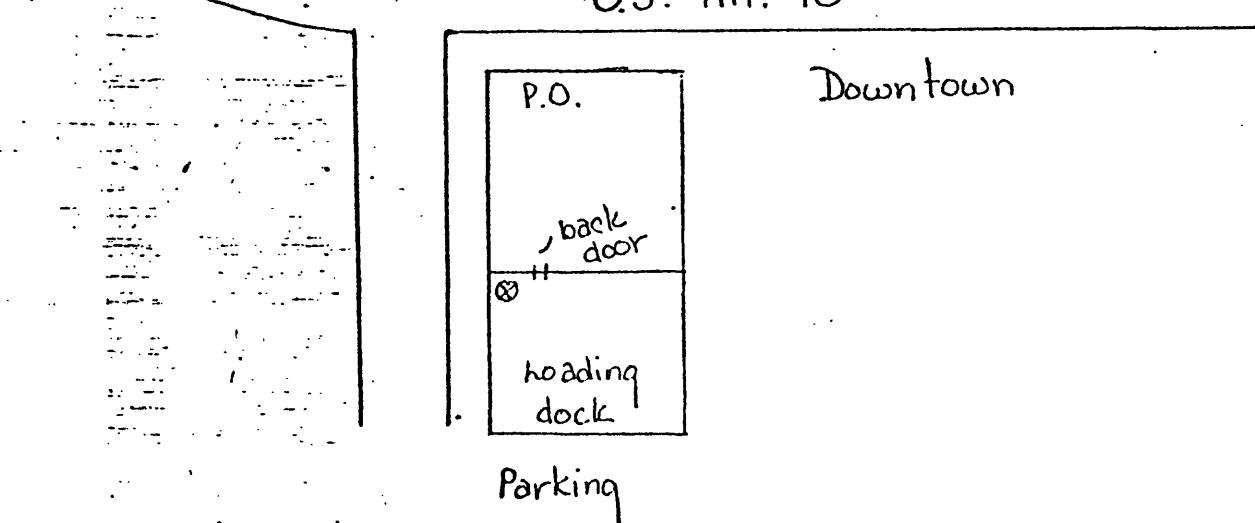
(1) 01355

U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION

STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY		
Montana	Thompson Falls Post Office	980556.65		
NEAREST TOWN	LONGITUDE	LATITUDE		
Thompson Falls	115° 21.16'	47° 35.73'		
ELEVATION	TOPOGRAPHIC MAP(S)			
734.7 m (2410')	Thompson Falls 1/62,500			
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
8/21/78	Brickey	G-235	Plains Post Office	980554.98 mgals

DESCRIPTION/SKETCH

Read at southwestern corner of new Post Office, on cement loading dock, 6 feet from back door. Picture taken.

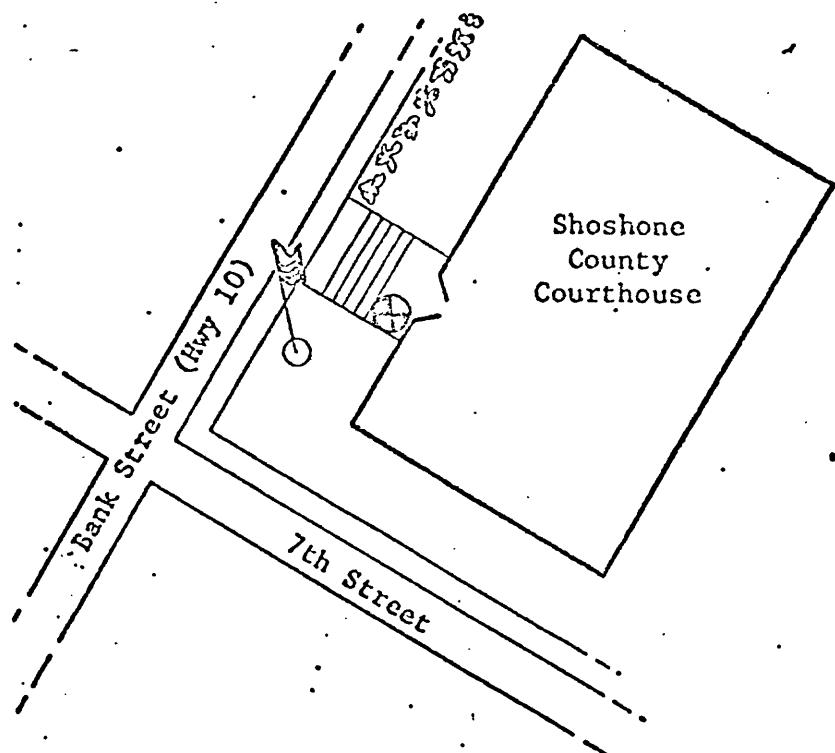


GRAVITY BASE STATION

LATITUDE 47° 28.28'N	(1)	STATION DESIGNATION	
LONGITUDE 115° 55.26'W	(1)	WALLACE	
ELEVATION 835.76 METERS	(1)	COUNTRY/STATE USA/Idaho	
REFERENCE CODE NUMBERS ACIC 4006-1 IGB 15675B		ADOPTED GRAVITY VALUE $g = 980\ 557.96$ mgals	
		ESTIMATED ACCURACY ± 0.1 mgals	DATE MONTH/YEAR 10/70

DESCRIPTION AND/OR SKETCH

The station is in Wallace, at the Shoshone Courthouse on the top main steps, one foot west of the main entranceway, one foot below USC & GS BM, on the concrete step. (1)



(1)

REFERENCE SOURCE

(1) 03405

Appendix B
Principal facts for gravity stations

Explanation of headings

identification

proj

Project name.

sta-id

Gravity station identification number.

location

latitude

North latitude in degrees, minutes,

and hundredths of minutes.

longitude

West longitude in degrees, minutes,

and hundredths of minutes.

elev, f

Station elevation in feet.

st

State where survey area is located.

observed gravity

Observed gravity in milligals.

theoretical gravity

Theoretical gravity.

corrections

Terrain correction out to 166.7 km

terrain

in milligals.

Bouguer

Elevation correction in milligals.

curv

Earth curvature correction in mgals.

special

Not used.

anomalies

Free-air anomaly in milligals.

free air

Complete Bouguer anomaly in milligals

complete-Bouguer

for designated densities.

Not used.

spec fields

BOUGUER GRAVITY DATA

thompson falls gravity stations
 m. kleinkopf
 Meter ID: e-134 Date: 04/08/80

STATION IDENTIFICATION proj sta-id	L O LATITUDE deg	C A T LONGITUDE deg	T I min	O N S ELE ST (in ft)	O B S E R V E D GRAVITY	T H E O R E T I C A L	C O R R E C T I O N S	T E R R A I N A O U G U E R	C U R V	S P E C I A L	F R E E A I R	A N O M A L I E S		SPEC d1=2.67 d2=2.45 FIELDS
												C O R R E C T I O N S	F R E E A I R	
north :	wa-1	47 34.81	-115 14.90	2498.0 mt	980540.76	980852.31	8.54	-85.20	-0.91	0.00	-76.58	-154.25	-147.86	
north :	wa2	47 36.37	-115 12.84	2476.0 mt	980537.31	980854.66	15.55	-84.45	-0.90	0.00	-84.54	-154.34	-149.13	
north :	wa3	47 37.61	-115 10.92	2551.0 mt	980531.23	980856.52	20.31	-87.01	-0.92	0.00	-85.43	-153.05	-148.27	
north :	wa4	47 39.00	-115 10.38	2624.0 mt	980535.75	980858.61	15.80	-89.50	-0.94	0.00	-76.14	-150.88	-145.22	
north :	wa5	47 39.66	-115 8.10	2655.0 mt	980534.09	980859.60	20.80	-90.55	-0.95	0.00	-75.85	-146.56	-141.47	
north :	wa6	47 40.51	-115 5.79	2752.0 mt	980540.34	980860.88	10.63	-94.10	-0.98	0.00	-61.13	-145.58	-138.91	
north :	wa7	47 42.54	-115 4.73	2875.0 mt	980542.29	980863.93	7.65	-98.06	-1.01	0.00	-51.33	-142.75	-135.21	
north :	wa-1	47 34.81	-115 14.90	2498.0 mt	980540.76	980852.31	8.54	-85.20	-0.91	0.00	-76.58	-154.25	-147.86	
north :	wa-1	47 34.81	-115 14.90	2498.0 mt	980540.76	980852.31	8.54	-85.20	-0.91	0.00	-76.58	-154.25	-147.86	
north :	wa8	47 35.11	-115 21.08	2339.0 mt	980557.34	980852.76	3.95	-81.48	-0.88	0.00	-70.79	-149.20	-142.74	
north :	wa9	47 34.56	-115 19.55	2468.0 mt	980552.57	980851.94	3.80	-84.18	-0.90	0.00	-67.31	-148.59	-141.89	
north :	wa10	47 33.86	-115 15.50	2485.0 mt	980543.54	980850.88	6.75	-84.76	-0.91	0.00	-73.59	-152.61	-146.10	
north :	wa11	47 32.15	-115 14.85	2960.0 mt	980518.88	980848.31	7.50	-100.96	-1.03	0.00	-51.13	-145.62	-133.42	
north :	wa12	47 34.44	-115 23.70	2620.0 mt	980542.83	980851.75	7.27	-89.36	-0.94	0.00	-62.58	-145.52	-138.78	
north :	su243	47 33.76	-115 27.06	2731.0 mt	980538.03	980850.73	8.28	-93.15	-0.97	0.00	-55.93	-141.77	-134.69	
north :	wa13	47 33.91	-115 24.86	2651.0 mt	980540.70	980850.96	9.21	-90.42	-0.95	0.00	-61.00	-143.16	-136.39	
north :	wa-1	47 34.81	-115 14.90	2498.0 mt	980540.76	980852.31	8.54	-85.20	-0.91	0.00	-76.68	-154.25	-147.86	

BOUGUER GRAVITY DATA

wallace cussmap gravity stations
 d. kleinkopf 1978
 Meter ID: e-134 Date: 03/05/80

STATION IDENTIFICATION proj ster-id	LATITUDE deg min	LONGITUDE deg min	ON TLE mt (in ft)	GRAVITY OBSERVED THEORETICAL	CORRECTIONS		A N O M A L I E S		
					TERRAIN	BOUGUER CURV	SPECIAL	FREE AIR	COMPLETE-BOUGUER SPEC d1=2.67 d2=2.45 FIELDS
north :	793	47 33.17	-114 49.88	3470.0 mt	980482.72	980849.84	4.10 -118.35	-1.15	0.00 -40.89 -156.29 -146.78
north :	794	47 38.97	-114 52.40	5305.0 mt	980402.87	980858.56	3.34 -180.94	-1.44	0.00 -43.00 -136.04 -121.29
north :	795	47 40.53	-114 51.92	4436.0 mt	980457.61	980860.91	4.19 -151.30	-1.33	0.00 13.73 -134.71 -122.48
north :	796	47 41.58	-114 50.25	4364.0 mt	980464.67	980862.48	6.66 -148.84	-1.32	0.00 12.45 -131.05 -119.23
north :	plains	47 27.66	-114 52.73	2468.0 mt	980554.98	980841.56	3.34 -84.18	-0.90	0.00 -54.53 -136.26 -129.53
north :	plains	47 27.66	-114 52.73	2468.0 mt	980554.98	980841.56	3.34 -84.18	-0.90	0.00 -54.53 -136.26 -129.53
north :	797	47 42.65	-114 48.10	4853.0 mt	980440.78	980864.09	6.58 -165.52	-1.39	0.00 32.91 -127.43 -114.22
north :	798	47 42.02	-114 47.55	4329.0 mt	980470.46	980863.15	2.94 -147.65	-1.32	0.00 14.29 -131.74 -119.71
north :	799	47 42.83	-114 46.10	4357.0 mt	980471.68	980864.36	1.91 -148.60	-1.32	0.00 16.92 -131.09 -118.90
north :	800	47 40.70	-114 47.25	4626.0 mt	980450.98	980861.16	3.92 -157.78	-1.36	0.00 24.71 -130.51 -117.72
north :	801	47 39.19	-114 47.15	4416.0 mt	980462.71	980858.89	2.86 -150.62	-1.33	0.00 16.97 -130.12 -117.83
north :	802	47 40.20	-114 48.80	4137.0 mt	980479.05	980860.41	3.62 -141.10	-1.28	0.00 7.57 -131.20 -119.77
north :	803	47 42.22	-114 43.17	4605.0 mt	980456.02	980863.45	3.33 -157.06	-1.36	0.00 25.49 -129.60 -116.82
north :	804	47 43.59	-114 43.72	4886.0 mt	980437.50	980865.49	4.68 -166.65	-1.40	0.00 31.33 -132.03 -118.57
north :	805	47 45.19	-114 44.74	4819.0 mt	980443.19	980867.91	3.51 -164.36	-1.39	0.00 28.30 -133.94 -120.57
north :	806	47 46.43	-114 45.18	4940.0 mt	980438.49	980869.77	2.96 -168.49	-1.40	0.00 33.11 -133.82 -120.06
north :	807	47 46.32	-114 48.92	5816.0 mt	980382.12	980869.60	6.07 -198.37	-1.49	0.00 59.22 -134.56 -118.59
north :	808	47 47.12	-114 49.17	5230.0 mt	980414.10	980871.71	9.01 -178.38	-1.44	0.00 34.04 -136.77 -122.70
north :	809	47 49.16	-114 47.48	4658.0 mt	980454.48	980873.87	4.32 -158.87	-1.37	0.00 18.51 -137.41 -124.56
north :	810	47 50.53	-114 47.18	5732.0 mt	980390.04	980875.93	6.06 -195.50	-1.48	0.00 52.93 -138.00 -122.26
north :	811	47 52.13	-114 48.03	6290.0 mt	980352.19	980878.33	10.82 -214.53	-1.51	0.00 65.10 -140.12 -123.21
north :	812	47 51.29	-114 45.69	5144.0 mt	980428.75	980877.07	3.90 -175.45	-1.43	0.00 35.24 -137.73 -123.46
north :	813	47 51.13	-114 43.02	4059.0 mt	980493.74	980876.83	2.69 -138.44	-1.27	0.00 -1.49 -138.51 -127.22
north :	814	47 49.95	-114 42.08	3089.0 mt	980551.04	980875.05	4.16 -105.36	-1.07	0.00 -33.59 -135.85 -127.43
north :	815	47 49.67	-114 44.31	3763.0 mt	980510.91	980874.63	2.03 -128.34	-1.21	0.00 -9.95 -137.48 -126.97
north :	plains	47 27.66	-114 52.73	2468.0 mt	980554.98	980841.56	3.34 -84.18	-0.90	0.00 -54.53 -136.26 -129.53

BOUGUER GRAVITY DATA

wallace cuspmap gravity stations
 d. kleinkopf 1978
 Meter ID: q-235 Date: 03/07/80

STATION IDENTIFICATION proj st-rid	L ATITUDE deg min	C A T I O N S ELE M in ft)	G R A V I T Y OBSERVED THEORETICAL	C O R R E C T I O N S		A N O M A L I E S FREE AIR d1=2.67 d2=2.45 PIELDS	
				L ONGITUDE deg min	TERRAIN BOUGUER CURV		
north :thompson	47 35.71	-115 21.04	2410.0 mt	980556.65	980853.66	3.39	-82.20 -0.88 0.00 -70.42 -150.11 -143.54
north :	862	47 48.28	-114 42.68	3581.0 mt	980522.72	980872.55	3.37 -122.14 -1.18 0.00 -13.16 -133.10 -123.22
north :	863	47 48.32	-114 45.69	4033.0 mt	980492.36	980872.61	4.00 -137.55 -1.27 0.00 -1.10 -135.92 -124.81
north : Plains	47 27.66	-114 52.73	2468.0 mt	980554.98	980841.56	3.34 -84.18 -0.90 0.00 -54.53 -136.26 -129.53	
north :hotsprin	47 36.52	-114 40.19	2845.0 mt	980558.33	980854.88	2.60 -97.04 -1.00 0.00 -29.06 -124.50 -116.64	
north :	864	47 53.83	-114 34.48	3193.0 mt	980547.51	980880.88	3.34 -108.90 -1.09 0.00 -33.17 -139.83 -131.04
north :	865	47 54.56	-114 35.76	3401.0 mt	980533.80	980881.98	3.50 -116.00 -1.14 0.00 -28.43 -142.07 -132.71
north :hotsprin	47 36.52	-114 40.19	2845.0 mt	980558.33	980854.88	2.60 -97.04 -1.00 0.00 -29.06 -124.50 -116.64	

banker & brickey 1979
2e-134 chron
Metter IU: 79176 Date: 11/26/79

IDENTIFICATION proj	STATION star-id	L	U	C	A	T	I	O	N	S	G	R	A	V	I	T	C	O	R	R	E	C	T	I	O	N	S	A	N	O	M	A	L	I	E	S
		LATITUDE deg min	LATITUDE deg min	LONGITUDE deg min	LONGITUDE deg min	ELV min	ELV min	ST min	ST min	OBERVED THEORETICAL	OBQUIRED BOUGUER CURV	TERRAIN CURV	FREE SPECIAL	COMPLETE-BUUGUER	AIR	d1=2.67	d2=2.45	FIELDS																		
87:	988	47	3.62	-115	19.71	3852.0	mt	980411.05	980805.40	8.16	-131.38	-1.23	0.00	-32.20	-156.66	-146.40																				
87:	989	47	2.92	-115	16.91	6175.0	ml	980273.66	980804.34	18.57	-210.61	-1.50	0.00	49.77	-143.78	-127.83																				
87:	990	47	2.87	-115	16.00	5986.0	mt	980285.58	980804.27	8.42	-204.16	-1.50	0.00	44.00	-153.24	-136.99																				
87:	991	47	5.12	-115	16.71	6560.0	mt	980252.62	980807.66	13.59	-223.74	-1.52	0.00	61.58	-150.08	-132.64																				
87:	992	47	5.79	-115	22.76	3637.0	mt	980428.45	980808.66	5.81	-124.05	-1.19	0.00	-38.27	-157.70	-147.66																				
87:	993	47	14.81	-115	13.12	3697.0	mt	980444.46	980822.23	9.94	-126.09	-1.20	0.00	-30.20	-147.55	-137.88																				

Shoshone Park Gravity Survey
 Wallace Cusmap 1969 Date: 11/26/79
 Meter ID: 9-159

STATION IDENTIFICATION proj stat-id	LATITUDE deg min	LONGITUDE deg min	D A T I I	O N S ELE ST (in ft)	G R A V I T Y OBSERVED THEORETICAL	C O R R E C T I O N S		A N O M A L I E S AIR d1=2.67 d2=2.45 FIELDS
						TERRAIN BOUGUER CURV	SPECIAL	
North : -	W41	47 31.62	-115 47.67	3983.0 mt	980471.25	980847.52	11.14 -135.85	-1.26
North : -	W42	47 31.71	-115 45.95	4541.0 mt	980437.49	980847.65	7.06 -154.88	-1.35
North : -	W43	47 31.80	-115 44.62	4965.0 mt	980414.56	980847.79	8.53 -169.34	-1.41
North : -	W44	47 31.73	-115 43.49	5384.0 mt	980393.04	980847.68	4.50 -183.63	-1.45
North : -	W45	47 31.52	-115 42.23	5802.0 mt	980367.68	980847.37	4.62 -197.89	-1.48
North : -	W46	47 31.05	-115 40.67	4629.0 mt	980431.64	980846.66	5.98 -157.88	-1.36
North : -	W47	47 30.76	-115 38.74	3626.0 mt	980484.45	980846.22	9.47 -123.67	-1.19
North : -	a	47 12.00	-115 50.66	2880.0 id	980494.50	980818.01	10.04 -98.23	-1.01
North : -	b	47 10.62	-115 50.88	3080.0 id	980486.47	980815.93	11.17 -105.05	-1.06
North : -	c	47 10.12	-115 51.05	3190.0 id	980483.18	980815.18	10.03 -108.80	-1.09
North : -	d	47 9.76	-115 51.34	3300.0 id	980478.64	980814.64	11.12 -112.55	-1.12
North : -	e	47 10.54	-115 51.62	3300.0 id	980477.70	980815.81	7.48 -112.55	-1.12
North : -	f	47 10.23	-115 52.00	3350.0 id	980474.33	980815.34	7.30 -114.26	-1.13
North : -	o	47 9.87	-115 52.91	3480.0 id	980465.09	980814.80	5.63 -116.69	-1.16
North : -	h	47 10.69	-115 53.53	3630.0 id	980458.23	980815.13	4.27 -123.81	-1.19
North : -	i	47 11.46	-115 50.65	2950.0 id	980487.60	980817.20	13.07 -100.62	-1.03
North : -	k	47 13.70	-116 1.20	2410.0 id	980540.41	980820.56	11.18 -82.20	-0.88
North : -	l	47 13.24	-116 0.97	2460.0 id	960533.50	960619.82	12.45 -83.90	-0.90
North : -	m	47 13.09	-116 1.42	2560.0 id	980530.62	980819.65	11.97 -87.31	-0.93
North : -	n	47 13.15	-116 2.22	2600.0 id	980528.54	980819.74	11.74 -88.68	-0.94
North : -	p	47 12.47	-116 2.47	2680.0 id	980527.35	980818.72	10.64 -91.41	-0.96
North : -	q	47 12.37	-116 3.31	2735.0 id	980523.83	980818.56	10.38 -93.28	-0.97
North : -	j	47 14.22	-116 1.32	2580.0 id	980532.42	980821.35	6.19 -88.00	-0.93